Waste Oil Burners —— How I Built and Use the Lionel Brute and Hot Shot

Waste oil burners have been the subject of many recent posts here, either questions about their construction, or questions about their use. Waste oil burners are a very different breed of cat from a propane burner, and you need a different mind set to operate one successfully.

What's the big difference? Well, propane is already a gas when it leaves the orifice in your burner, whereas oil is not. Propane will ignite easily and will sustain combustion, given a reasonable amount of oxygen, whereas oil does not. Oil must be either atomized or vaporized.

Then why use it? For one thing, oil produces significantly more heat than does propane. And also, propane has become quite expensive while waste oil is generally free. I take my empty five gallon plastic jugs to local motorcycle shops and they are glad to get rid of it. (I tip the guys who fill my jugs so they are helpful when I come back for more.) I find used motorcycle oil is generally cleaner than car and truck oil.

I built both the Lionel Brute and the Lionel Hot Shot, and have been using them for about four years. I absolutely love them. They are simple to build, simple to use, and produce an incredible amount of heat. The downside is they are not something you just start up and leave for thirty minutes while you go get your molds ready. They require adjustments to keep the furnace atmosphere steady. For me—I am a sculptor and only melt three or four times a month—that is no problem.

If you are only interested in the more complicated types of burners, with nozzles and pressurized tanks and turbolators and pumps, you may still find something useful here. I have no experience with those things, so I can't comment on them.

Here is my large furnace with the Brute running while melting a #30 crucible of bronze. As you can see there is no smoke whatsoever.

The vent hole is 5 inches.
The inside of the big furnace. The clearance between crucible and hot face is plenty for good breathing.

The small furnace with the Hot Shot burning. Once again, no smoke.
It's hot in there.

A #8 crucible. There is sufficient space between the crucible and the hot face for the oil burner to breathe freely.

The vent hole in the lid is 4 ½ inches. That is plenty for the breathing. It would be nice to have it 5 inches for getting larger chunks of scrap in.
The operation of these waste oil burners has presented certain problems and has generated many questions.

- How do I get it started?
- How do I keep it from smoking?
- Why does raw oil run out of the drain hole of my furnace?
- How do I regulate the oil flow precisely?

The most important thing to know about waste oil burners is that it takes a lot of heat to vaporize the oil so that it can ignite and burn properly. That means the furnace interior must be at minimum red hot or it is going to smoke and drip raw un-vaporized oil out of the drain hole or the tuyere. If it smokes more than just a little when you start the oil either the furnace is not hot enough or you are not pouring in enough air.

I run the burner on pure propane until the crucible is good and red before I begin to turn on the oil. I do that gradually over a minute or so as I simultaneously turn down the propane, and turn up the blower. It takes more air to burn oil.

To test the flame I use a clean strip of galvanized sheet metal. I hold it over the vent hole for a few seconds. If it has any soot on it I am running on the rich side of neutral. If it is still bright and shiny I am running on the oxidizing side of neutral. I try to keep it so I get just the faintest hint of soot when melting bronze.

To regulate the oil flow you must use a needle valve. Available from McMaster-Carr. Cat. # 5049K9 – Cost $7.66

http://www.mcmaster.com/#flow-control-needle-valves/=t5jxj0